Summary of Hg Jet Target Progress

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Weekly Collaboration-Telecon Meeting
September 24, 2004

Attended the Meeting in CERN to Report on Hg Handling Issues

Issues Dealing With Safe Handling of Mercury

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Meeting on High-Power Mercury Jet Experiment

May 26-27, 2004

CERN
Geneva, Switzerland

NUCLEAR SCIENCE AND TECHNOLOGY DIVISION
OAK RIDGE NATIONAL LABORATORY
U.S. DEPARTMENT OF ENERGY

UT-BATTELLE

Mercury Containers/Shipping

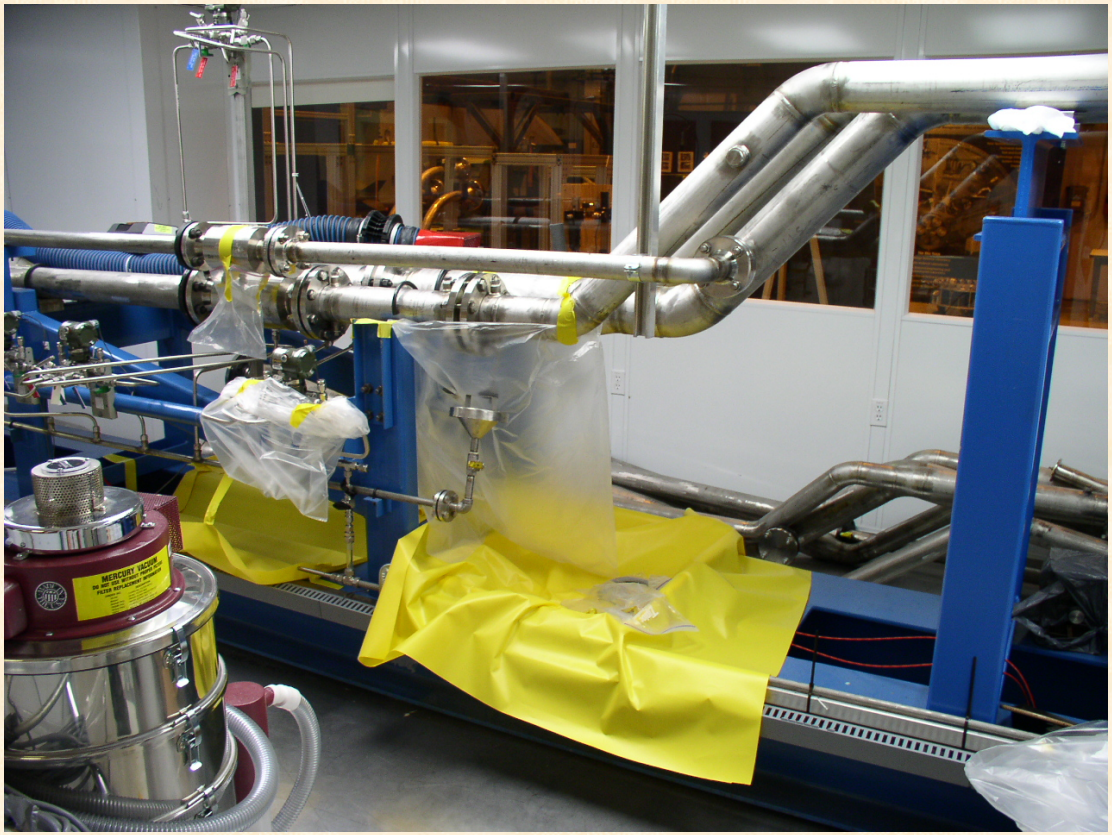
- Standard flask is 2 liters
- Flask + Hg weighs ~35 kg

Filling (cont.)

- TTF vacuum pump was used to transfer Hg directly into the storage tank
  - Lower risk than using the peristaltic pump
  - Faster operation, ~ 1-1/2 minutes per flask

TTF Operations - Containment

- You cannot have too much containment!



Handling Activated Hg Adds Another Level of Concern

- Small quantity of Hg was released somehow from handling the target
- Vapor monitor would have alerted the presence of Hg
- Herculite taped to floor area
- ~3 x 10^3 dpm/100 cm^2 contamination level

Conclusions

- ORNL has extensive experience handling Hg based on operating the TTF and other smaller test loops
  - 1400 liters, full scale SNS flow loop
  - Hg was installed with a vacuum pump; extensive use of spill containment; He leak check before operating
  - Developed procedures for operating TTF and safe handling of Hg
- Numerous interventions have been undertaken to add/modify TTF test equipment
  - Experience with dismantling pipe flanges, pipe cutting, and welding
  - Vapor monitors always in use; decontamination using HgX and HEPA vacuum
- Handling activated mercury requires these same precautions and procedures, but at an even higher level of alertness

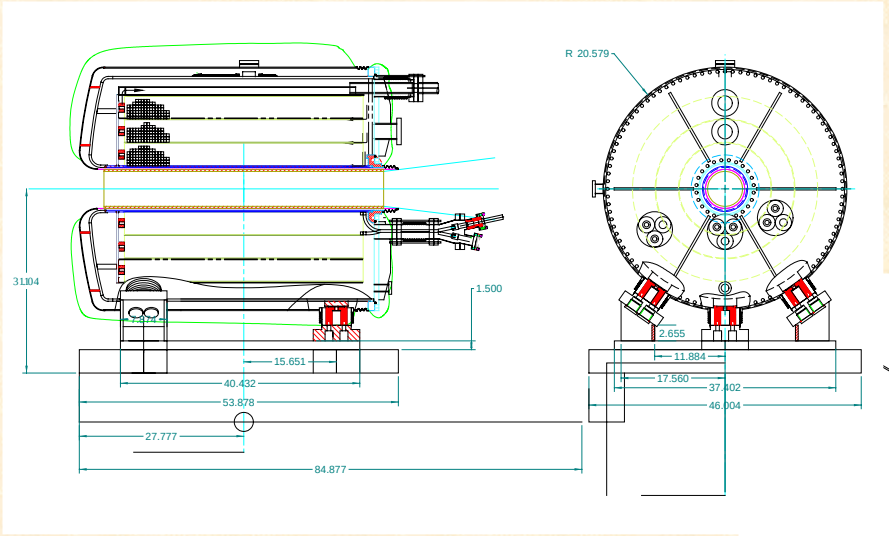
Held a Hg Target Design Kickoff Meeting at ORNL, Sept. 1

Since the target system interfaces with all other systems, it was appropriate to cover all aspects of the system design, including a preliminary schedule for development

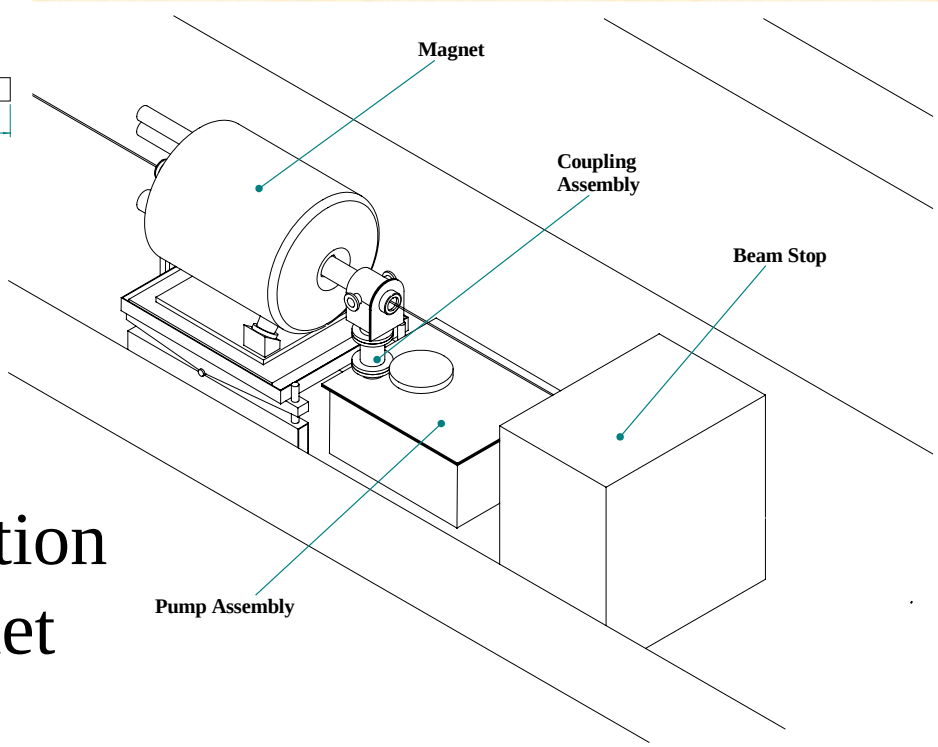
- Attendees from BNL, MIT, Princeton, CERN, RAL
  - CERN Safety Requirements/Dose Rates/Tunnel Configuration
  - Magnet/Cryostat Design
  - Hg Target "Strawman" Design
  - Optical Diagnostics
  - Beam Windows/Target Nozzle
  - Design Schedule
  - D&D Issues

And, also toured SNS site and our Target Test Facility

Presented a “Strawman” Target

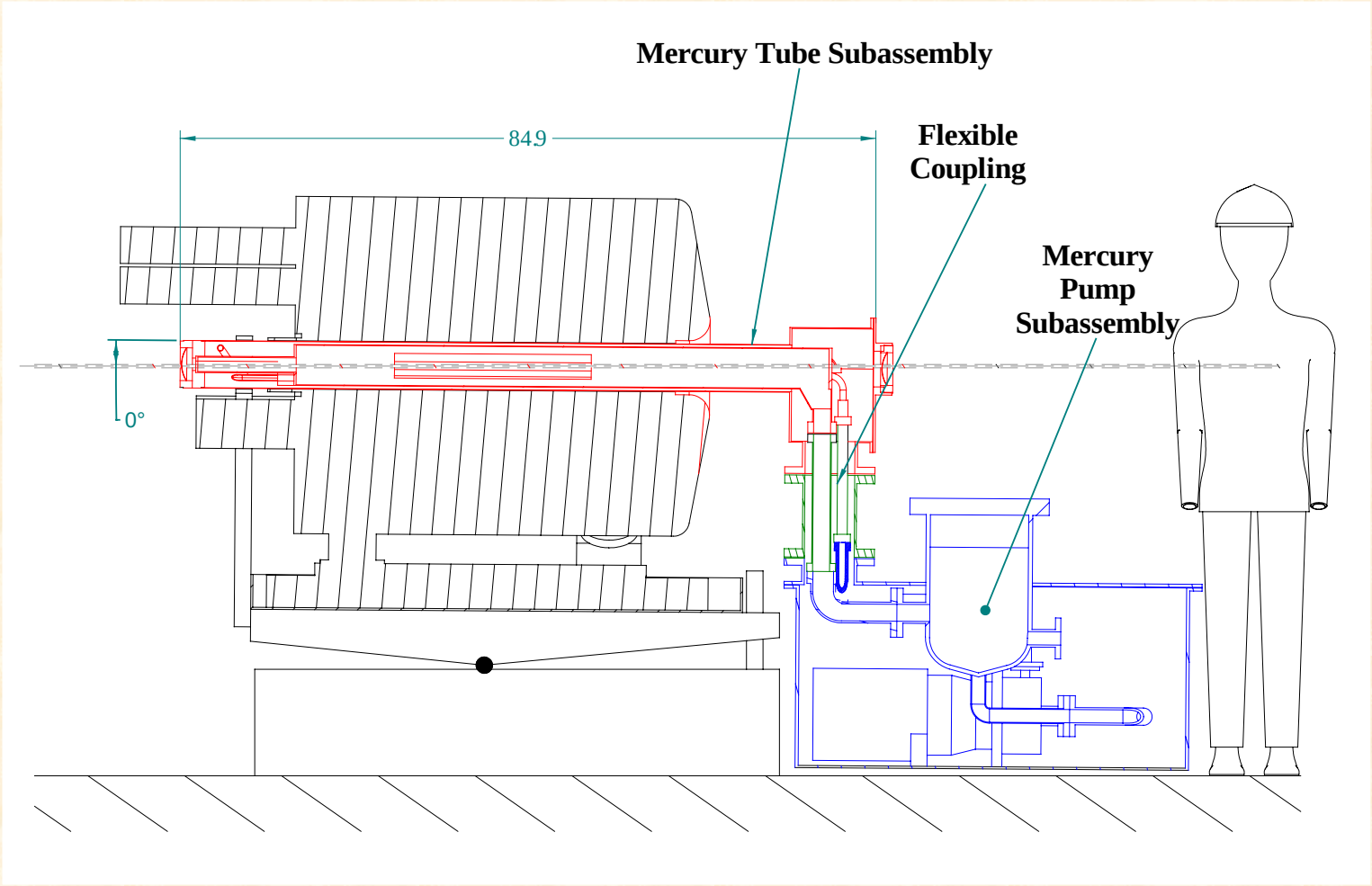


MIT Magnet Design

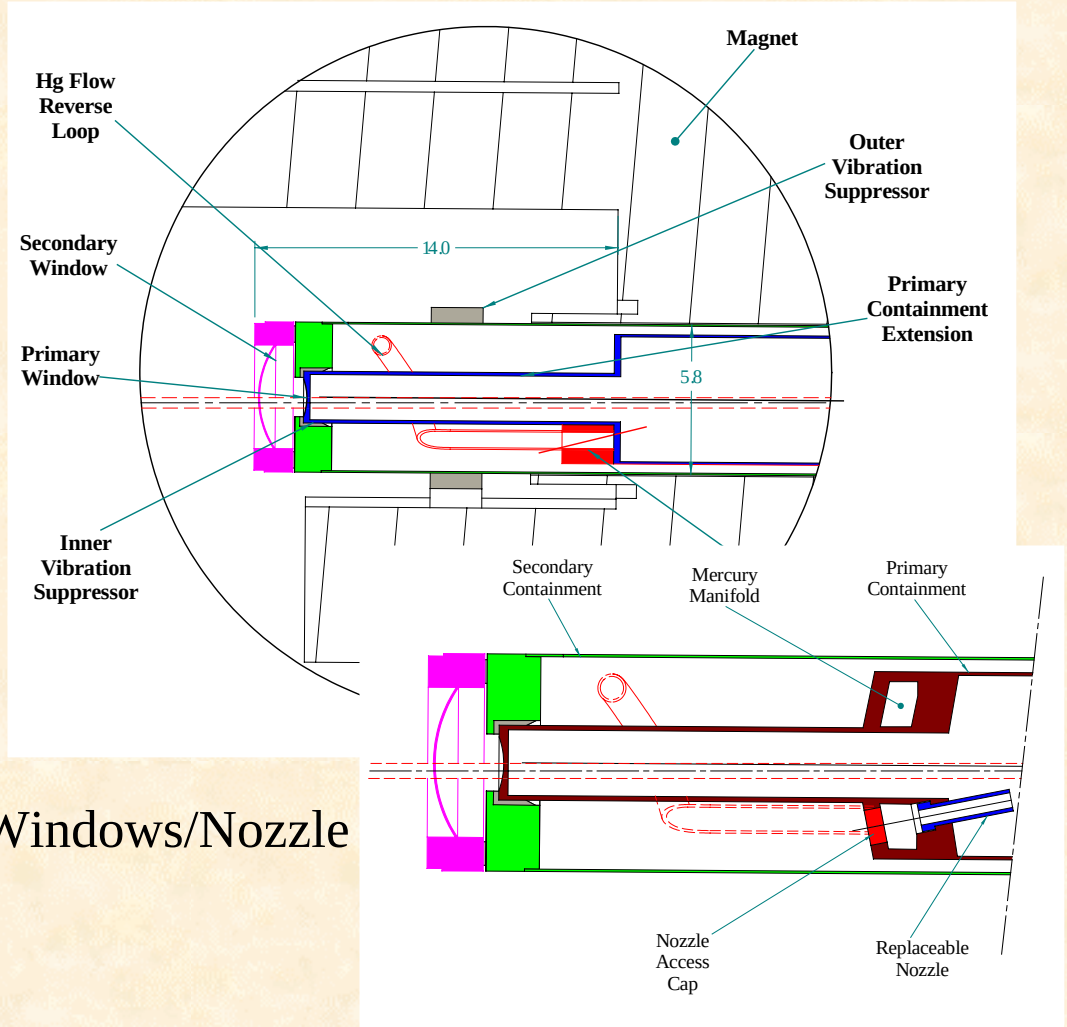


Target Configuration Installed in Magnet

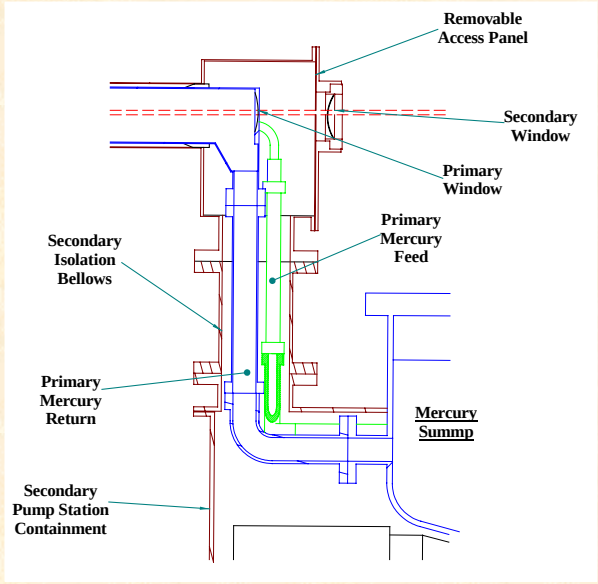
Strawman Target - Scale



Target Windows/Nozzle Issues



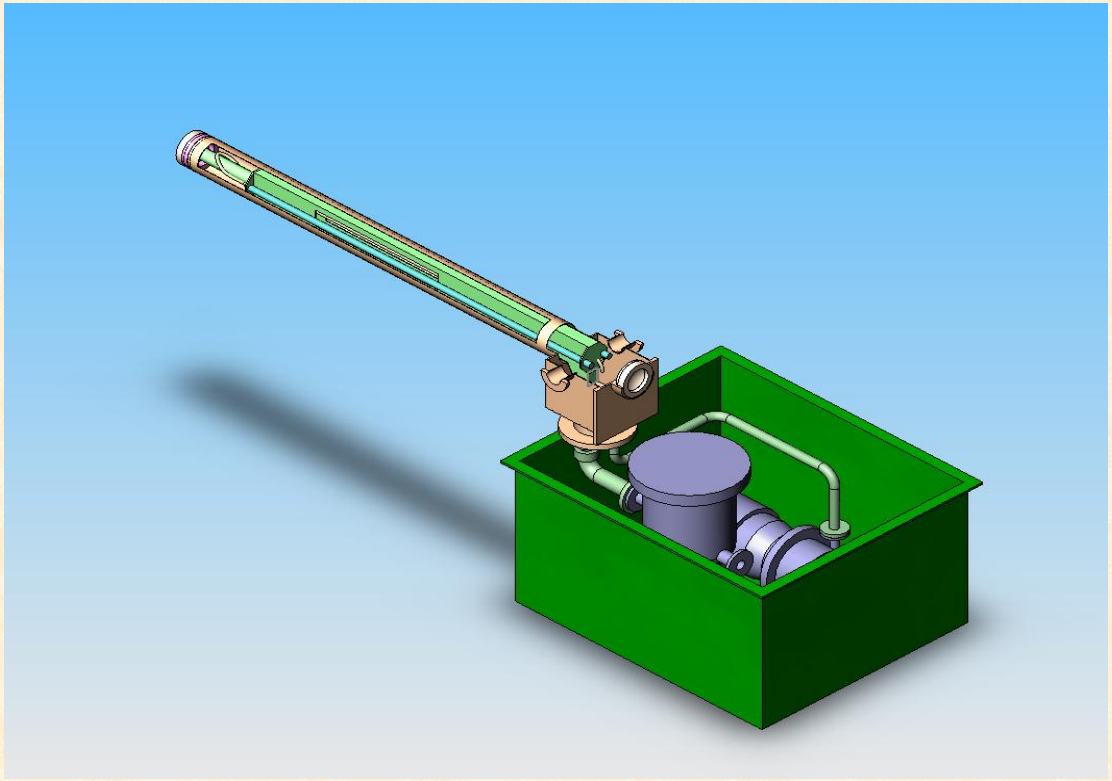
Windows/Nozzle



The Down-Beam Interface w/ Pump Module

A Solid Model Is Under Development

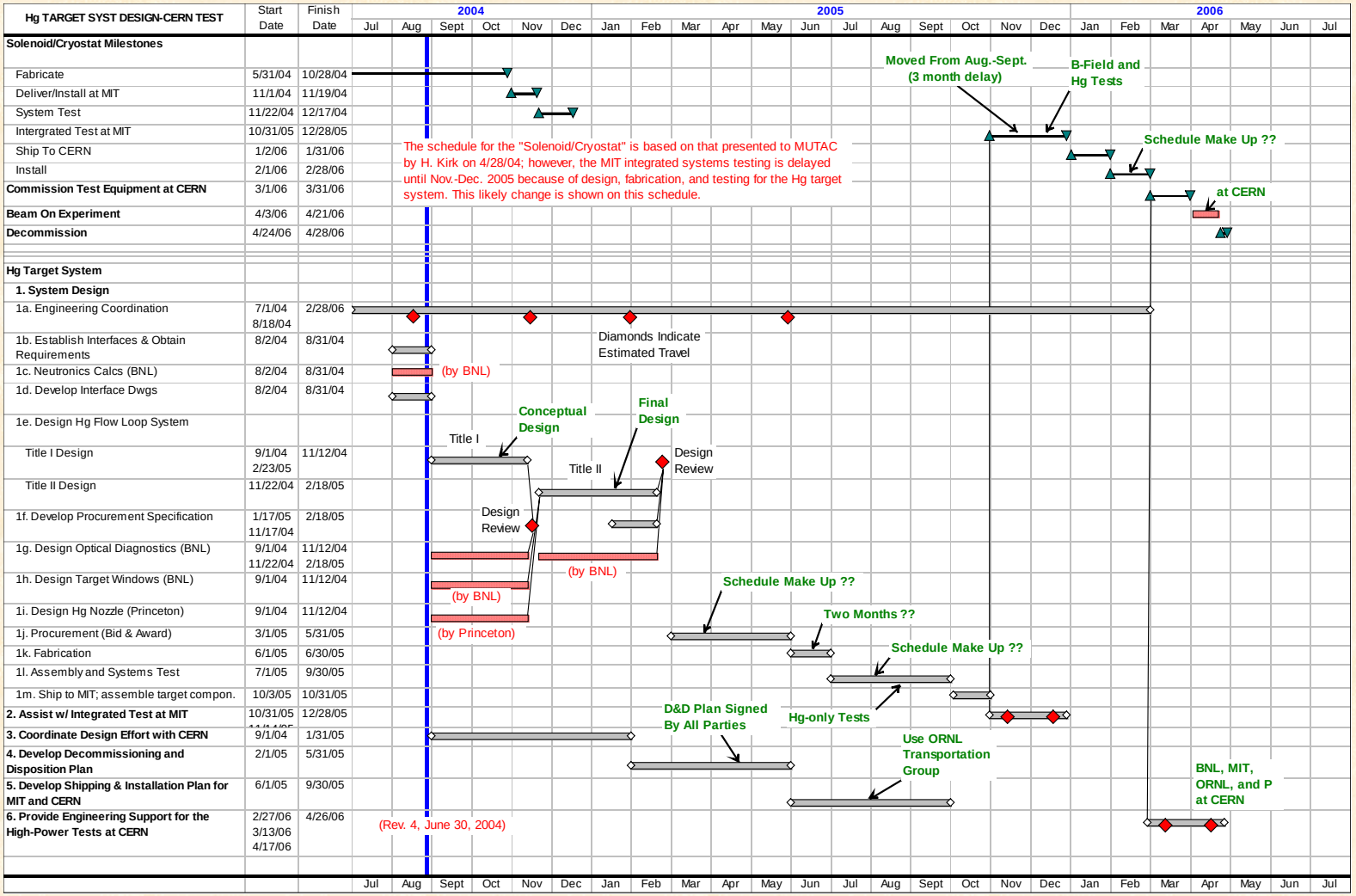
Target containment for delivery tube(s) and mag-drive pump and motor



Geometric Orientation of the Beam, Magnetic Axis, and Hg Jet Have Been Established

- Option 2 from Kirk McDonald's memo is the baseline (shown in PDF, can't show here)
- Sketch is under development for all to see
  - PB parallel with tunnel floor
  - BT is 66 mrad relative to PB, and up-beam end of the magnet is tilted up
  - Jet is 100 mrad relative to PB
- We are planning to write a "Hg Jet Target Design/Interface Requirements Document"

Hg Jet Development & Test Schedule



Current/Near Term Tasks for Target Development

- Redo our schedule for a FY'07 test at CERN
- Re-evaluate the funding needs
- Continue developing the target model
- Draft a "requirements" document
- Continue to participate in tele- and video-conferences, and other interactions
- Work with CERN safety experts to establish criteria that could affect our design and installation plans